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CONIFERS SCORCHED IN THE PANORAMA FIRE

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ABSTRACT

The Panorama Fire burned in late November 1980 on the San Bernardino National Forest. Although a large area was affected, most of the vegetation killed or damaged was chaparral and much of the area was inaccessible by road. A picnic/parking area and a point of historic interest located along State Highway 18 on the Arrowhead Ranger District are accessible and contained scorched conifers. The two areas were evaluated and predictions were made of the amount of tree mortality expected under different management alternatives. The alternatives discussed include no action, thinning to relieve competition (includes slash treatments and treatment of stumps with borax) and application of a protective insecticide, Sevimol 4, to standing trees.

INTRODUCTION

On January 27, 1981, Dave Schultz, John Kliejunas, and Jim Allison from the FPM Staff examined two areas adjacent to State Route 18 that were involved in the Panorama fire. Jim Bridges, Forest Silviculturist, Ken Slater, South Zone Timber Management Officer, and Mike Miller from the Arrowhead RD provided assistance.

OBSERVATIONS

The first area examined was at the top of Daley Canyon, near the Historic Marker. Most of the damage was caused by backfires started near the road. Access to the damaged trees is generally good, with several spur roads and

moderate slope near the State highway. Most of the fire-damaged trees in the area were ponderosa pine, with a few incense-cedar, sugar pine, white fir and black oak. With the exception of a few trees that had already been marked for cutting, the overstory ponderosa pine all had 20% or more green foliage, as well as half or more of the crown which looks like it will produce foliage in 1981. Most of the understory ponderosa pine had no green foliage, although a few of the larger saplings appeared to have live buds. The few sugar pine present seem to have suffered relatively little damage. There was almost no crown scorching and the cambial damage was low enough to indicate that most of the sugar pine should survive. There were several white fir in the area and although most looked like they would survive, one tree which was about 20 inches dbh had the crown scorched almost to the top. At the most, this tree would have about 10% live crown in 1981 and it probably won't survive. Many of the understory trees were incense-cedar and it looks like they have no live foliage or buds. One or more of the overstory incense-cedar had lost all the foliage and buds, and has no chance of survival. The black oak in the area didn't have many leaves at the time of the fire and consequently there was little damage to the limbs and buds. A few stems might be lost to cambial damage but they will probably be replaced by sprouts. There are a total of 40-50 fire-damaged trees which have a reasonable chance of surviving in the immediate travel influence zone.

The second area examined was at Baylis Park. Access to trees in the view areas was very good. Fire damage ranged from almost none in the east end to very severe on the west end. The site was a bit harsher than the first area examined. The soil consisted mainly of decomposed granite and a fair amount of exposed rock. Some of the vegetation such as yerbasanta and Coulter pine suggests that the site may be marginal for forest trees. The overstory trees were predominantly ponderosa pine, with a few incense-cedar, sugar pine and oaks. Many of the ponderosa pine had no fire damage or only a small amount of bark scorching on the lower bole. Ordinarily their chances of survival would be excellent, but their location on an exposed point with porous soil and surrounded on three sides by fire-damaged trees of the same species, makes the survival of some of the older and more aesthetically valuable specimens questionable, particularly if the winter precipitation is much below normal. Fire damage to the trees was most severe downslope (south) and west of the parking/picnic area. The fire was hot enough in these areas to have popped the bark off numerous small oaks and killed 15-20 ponderosa pine, about 5 incense-cedars, several sugar pine and one Coulter pine. Two 24-30-inch-dbh sugar pines showed no foliage damage and little bole scorch, but about 50% of the cambium was killed by the fire around the root crown. If these two trees aren't attacked by insects, they will probably survive for a number of years, although having half the cambium girdled at the root collar will probably reduce the lifespan of these trees. The total number of conifers which stand a good chance of surviving through 1981 in the immediate Baylis Park area is 100-150 trees.

DISCUSSION

Immediately following a fire, a common response is to attempt to save as many trees as possible. In stands managed for timber production, trying to save trees within a burn may be counter-productive. Isolated live trees will increase the cost and difficulty of site preparation and planting. If the leave trees die at a later date, salvage operations may damage the regeneration. In addition, the leave trees may serve as sources of dwarf mistletoe seed or may, in time, become high-risk trees which can serve as foci of bark beetle infestations in future stands. A decision to try to save fire-damaged trees in the two areas examined on the Arrowhead RD is probably justified because of their high in-place value for recreation or watershed protection.

Shortly after a fire, the trees in the area can be grouped according to the likelihood of their survival. Trees which have been untouched by the fire, or have suffered only a slight amount of foliage or cambial damage will generally survive, although this prediction should be modified according to the location of the tree. Undamaged trees located on the edge of the burn, or immediately adjacent to a damaged, but still live tree of the same species may come under attack by bark beetles. This situation does not mean that bark beetles have increased their numbers in the damaged trees and then spread to the undamaged trees, but rather that one or both of the following situations has occurred. Otherwise undamaged trees on the edge of a burn may be subjected to a sudden exposure due to the loss of nearby foliage and ground cover, which may make them more susceptible to bark beetle attack. Also, if nearby trees are damaged, but still have considerable healthy cambium, the damaged trees may come under attack by bark beetles. The aggregating pheromone released by the beetles which successfully attack the damaged trees may attract enough other beetles to spill over onto nearby undamaged trees.

A second category of tree resulting from the fire would be those which have considerable damage, but are likely to survive if they are not attacked by bark beetles. The key characteristics useful in determining whether fire-damaged trees are likely to survive are the date of the fire, site index, individual tree vigor prior to the fire and the severity of crown and cambial damage, which is influenced by tree species. Using these characteristics, the majority of the trees in both areas examined would have a chance of survival. The Panorama fire occurred in late November, which means that radial growth was probably complete; the food reserves for 1981 twig and terminal growth were already stored; and the ponderosa pine buds were protected at the time of the fire. An earlier fire would have been more damaging. Both areas appeared to be about site 3, and the affected trees ranged from fairly vigorous young trees to older trees which appeared to be slowing down in growth. Crown and cambial damage in the older (less vigorous) trees was generally less severe than that in the younger trees, and consequently, their survival rates should be similar. The trees in the Panorama fire which were injured but likely to survive, met the following criteria:

SPECIES	CAMBIUM INJURY %	LIVE CROWN % (BUD & TWIGS)	GREEN FOLIAGE %
Ponderosa pine	0-25	50 or more	15 or more
Sugar pine	0-60	50 or more	40 or more
White fir	0-25	50 or more	40 or more
Incense-cedar	0-25	50 or more	40 or more

Trees which were more severely injured than the criteria listed above were categorized as being dead, or likely to die in the near future, regardless of any type of treatment.

In a stand managed for timber production in a year with normal precipitation, the majority of those trees categorized as uninjured, or injured but likely to survive, would receive no further treatment. In stands managed for recreation, which have fairly good access, there are additional steps that could be taken to insure the survival of the leave trees. One step that might be taken is to remove trees before late March to mid-April which are severely injured but still have a lot of healthy cambium and are within about 20 feet of healthy trees. If no other preventative actions are taken, the severely injured trees may be successfully attacked by bark beetles and the aggregating pheromone they emit will attract other beetles to the area. If enough beetles are present, they may be able to overcome a nearby uninjured tree. Another step that could be taken is to thin the denser clumps of trees. Although the fire eliminated much of the ground cover and some of the competing vegetation, there are still some aggregates in both areas which are fully occupying the site. The thinning could probably be accomplished by cutting those trees which are still alive but have a fairly low probability of survival. Trees which are good candidates for early removal would include suppressed trees and those with less than 40% live crown or more than 30% basal girdling.

If any cutting is done in the burned areas this spring, including firewood cutting, several measures should be taken to prevent future problems. The roots of most of the burned trees, including those which appear dead, will remain alive for months. Some of the cut stump surfaces may be suitable infection courts for Fomes annosus spores. Treatment of the stump surfaces with granular borax would be over 90% effective in preventing infection by F. annosus.

Any cutting in the area may also produce slash with succulent cambium. Fresh slash is commonly attacked by pine engraver beetles, Ips spp., during the spring. If their breeding success in the slash is good, it can lead to considerable local top-killing and mortality by mid-summer. In a high-use recreation area, the most acceptable methods of modifying the slash to make it unusable for breeding by Ips spp. might be chipping or removal of the slash from the site. Other methods that would also be effective include burning the slash while it is still fresh or tightly covering fresh slash piles with clear plastic in exposed locations to heat the slash by solar radiation. Two situations that should be avoided are piling fresh slash without any further treatment, and allowing fresh slash to accumulate around leave trees.

A third course of action which would increase the survival of trees in the burn area is to apply insecticide to the bole of those trees expected to survive, to prevent attack by bark beetles. The insecticide Sevimol 4 is registered in California under EPA Special Local Need Registration No. CA 770318 to protect pines from mountain and western pine beetles. A recent field experiment by the Pacific Southwest Forest and Range Experiment Station demonstrated that a single application of Sevimol 4 at the registered rate to a height of about 35 feet on the bole of ponderosa pine up to 20 inches dbh was successful in preventing attack by western pine beetle in over 80% of the trees, even after the trees were baited 3 times with western pine beetle pheromone. A height of 35 feet is about the maximum that could be expected from a standard hydraulic sprayer, and that will cover the portion of the bole most likely to be attacked by the western and mountain pine beetles. It would be advantageous to use a boom truck if one is available and access is adequate to reach as high on the trees as possible, in case the western or mountain pine beetles attack higher, or if other bark beetles or borers attack the trees.

If the 45-50 trees with a reasonable chance for survival near the Historic Marker were treated to a height of 35 feet before the weather warms enough for significant beetle flight (probably April), it would be expected that at least 35-40 of these trees would be protected from lethal attacks by the western and mountain pine beetles until May 1982. If the spring 1981 precipitation is much below normal, or if there is a buildup of Ips spp. in the immediate area, several more trees would be expected to die. A similar proportion of the trees at Baylis Park would be expected to survive until 1982 if they are treated.

It should be recognized that insecticide treatment isn't a permanent cure for fire damage to trees. The insecticide will provide protection to that part of the bole which was treated for one year, while the effects of the fire will persist for a longer period of time. Those portions of the ponderosa pine crowns that were scorched, but still have live twigs and buds, will have only one year of needles in 1981. This is less than the normal complement of needles, although it will help to keep the tree alive until more needles can be produced. In addition, many of the trees have had numerous small patches of cambium killed between the bark plates or on exposed roots, and the cumulative effect can place a considerable stress on the tree. Finally, it should be recognized that even before the fire some of the trees in both areas were nearing the end of their normal biological lifespan. It should be expected, therefore, that the insecticide treatment would prevent the immediate loss of most of the trees, but that over the next decade or two a considerable number of the injured trees will die. It is probably not too early to begin to formulate plans for the orderly replacement of the older and/or more severely injured trees in both areas.

MANAGEMENT ALTERNATIVES

1. Do nothing. Near the Historic Marker there are already 3 or 4 trees in the overstory which have no chance of survival. If the spring 1981 precipitation is above normal, no more than 3 or 4 additional trees would be expected to be attacked by bark beetles. If the spring pre-

cipitation is much below normal, as many as 15-20 trees could come under attack. At Baylis Park there are 25-30 trees which are already dead. If the spring precipitation is above normal, an additional 5-10 trees could be expected to come under attack. Below - normal spring precipitation could lead to considerable mortality in the area. Additional mortality would be expected in the future in both areas.

2. Remove severely injured and suppressed trees before May. Removing those trees most likely to be attacked by bark beetles, before they actually come under attack, will eliminate potential sources of bark beetle aggregating pheromone from the areas. This will increase the probability of survival of adjacent trees. Removing injured trees which have, or are expected to produce live foliage would also increase the survival of adjacent trees by reducing competition for moisture. Any type of cutting in the area could result in an increase in mortality unless measures are taken to prevent an increase of Ips spp. in the slash and infection of the stumps by Fomes annosus.

3. Treat the boles of trees that have survival potential with Sevimol 4. If it is assumed that only those trees with an excellent chance of survival were treated, and that there are no other factors such as moisture stress or an increase in beetle populations, then the survival of the treated trees probably wouldn't be materially different from untreated trees. The treatment would give one year of protection to those trees which have enough live cambium and foliage to survive, but might be very susceptible to bark beetles due to their weakened condition. The greatest benefits of the treatment would be realized if an additional stress such as moisture deficiency were placed on the trees. The loss of treated trees under additional stress would probably approximate the loss of untreated trees under favorable conditions. Additional losses would occur with the passage of time. A pesticide-use proposal and an Environmental Assessment would be necessary for the treatment.

   FPM monies are available to fund approved protective spray projects. Requests for such monies should be made on Form FS-3400-2, Project Proposal, accompanied by support documentation listed in FSM 3453.5 (1.a thru 1.k — omit 1.1 and 2). This list covers important points that are sometimes omitted from the NEPA document produced as the result of the District or Forest decision - making process. It can serve simply as a reminder, then, of some things FPM would look for in the EA or EIS. The project work plan, safety plan, and plan for monitoring and post - treatment evaluation should be produced for line officers and project personnel - not FPM. (FPM should receive copies - if they aren't part of the EA or EIS - to help document project planning soundness.) FPM people will help prepare them if requested, such as by providing technical information and advice on content.

4. Plan to replace the injured trees. Although many of the injured trees will survive through 1981, it is highly likely that some additional trees will die over the next 10 years or more. Some natural regeneration may take place because the fire has prepared an excellent seedbed and there will probably be some stress cone crops from the injured trees. The natural regeneration may not be satisfactory, however, if

the distribution or number of trees doesn't meet management objectives or if cone crops don't occur until after grass or brush has invaded the areas.

If the two areas are targeted for rehabilitation and protection, then, from a pest management perspective, the integration and application of management alternatives 2,3, and 4 would be the most appropriate action.